

*Geography vol. 1.*  
A N  
A C C O U N T

Of the M E T H O D S used to describe

L I N E S,

O N

Dr. *HALLEY*'s Chart

O F T H E

*Terraqueous Globe,*

S H E W I N G T H E

Variation of the Magnetic Needle

About the Y E A R 1744.

In all the Known S E A S.

W I T H

Some Occasional O B S E R V A T I O N S  
relating thereto.

---

By *William Mountaine* and *James Dodson*, Teachers  
of the M A T H E M A T I C S.

---

L O N D O N :

Printed for *William Mount* and *Thomas Page* on *Tower-Hill*, 1746.

A C C O U N T

OF THE

L I N E

O F

D R H A L L



O F T H E

U N I V E R S I T Y

O F O X F O R D

AND

THE

ROYAL SOCIETY

OF L O N D O N

AND

THE

ROYAL SOCIETY

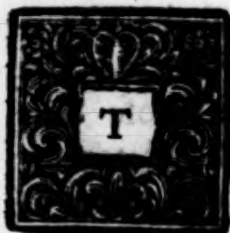
OF L O N D O N

AND

THE

ROYAL SOCIETY

## AN ACCOUNT, &amp;c.



THE first Discoverers of the Polarity of the Magnetic Needle, conceived, that the Direction thereof was, at all Times, and in all Places, due North ; therefore the Navigators of that Date employed the Discovery in determining the Ship's Course ; for since they had from the Compass a visible Meridian, they could measure the Angle which the apparent Path of the Vessel made therewith.

But Experience afterwards shewed, that this Polarity was not exact ; the Needle in some Places pointing to the Eastward, and in others to the Westward of the true North ; this Deflection from the Meridian is usually called the Variation of the Needle or Compass, and was then supposed to be at all Times the same, in the same Place.

Here also the Insufficiency of their Magnetic Knowledge was soon discovered ; for scarce Fifty Years had past before it appear'd, that Difference of Time had alter'd the Variation in the same Place.

Since therefore the Mariners Compass will not give the Ship's Course truly, unless the Variation at that Time and Place be known, it has been found necessary to make, and preserve Observations of the Variation at different Times and Places, for the Service of the Navigator.

The most valuable and extensive Work of this Kind that has appear'd, was Dr. H A L L E Y's *Chart of the*  
A 2 World ;



*World*; in which, on the *Atlantic* and *Indian* Oceans, he has described Lines, to shew the Quantity of the Variation, in the different Parts of those Seas, at or about the Time of Construction, viz. the Year 1700.

Previous to this Undertaking, the Doctor made a Voyage to the Southward, and had observed the Variation, in several Parts of the *Atlantic* Ocean; he had Assistance of other able Navigators for those Seas in which himself had not sail'd; from these Materials, together with his peculiar Sagacity, he was able to shew the Variation, in many Places beside those for which he had Observations.

But the *Variation Lines* of this excellent Performance are now of but small Use, thro' the Length of Time since they were drawn, and therefore the Proprietors of the *Chart* have been at the Expence of substituting others in their Place, adapted to the present Time.

As the Persons employ'd to perform *This*, had not Opportunity to make Observations themselves, it was thought expedient to gather a great Collection of those made by others; in order (by concurrent Testimony) to prove the Validity of those, on which the Construction should be founded.

To which good Purpose,

The Honourable Commissioners of His Majesty's *Navy*, gave the Constructors leave to search the Journals of the Masters employed in that Service;

The Honourable Directors of the *East-India* and *Royal-African* Companies, gave a like Licence, to examine the Journals of the Commanders and Mates employ'd by them;

The

The Proprietors of the *Chart* furnished about 1100 Observations, made by Mr. *Robert Douglass*, in divers Voyages, wherein he acted as a Teacher of Navigation on Board His Majesty's Ships ;

*William Jones*, Esq; contributed a Set of accurate Observations made in an *East-India* Voyage ;

The Constructors examined the printed Voyage of the *Centurion* round the World, as published by Mr. *Pascho Thomas*, Teacher of Navigation on Board that Ship; and that of Captain *Middleton*, to discover a North West Passage.

All which Assistance is gratefully acknowledged.

They also applied to the Honourable Committee of the *Hudson's Bay* Company, but without the desired Effect ; and,

The Proprietors advertised the Design they had undertaken, desiring the Assistance of those who had made any Observations either by Sea or Land ; but to their great Disappointment, did not get a single Observation communicated in Consequence thereof.

In the Journals which the Constructors examined, they found,

That some contain'd no Observations of the Variation ;

That in some wherein such Observations were found, no Account of Difference of Longitude was kept ;

That few contain'd Observations made near Home, (as supposing the Variation there generally known) in any Harbour, or even within Sight of Land ;

That, where an Account of the Difference of Longitude was kept,

Several Instances have been observed, in Journals of identical Voyages, wherein the Ship's Place, at the same Time, has been differently determined ; and,

Some

Some Journals kept on Board Ships in the same Fleet, have differed more considerably.

Observations of the Variation, made under any of the above-mentioned Disadvantages (however serviceable they might have been) were rejected; a very considerable Number occurring, which were made by those, whose Accounts were as correct as the Practice of Navigation will permit.

But the Difference of Longitude made between two Ports, by different Ships, or by the same Ship in different Voyages, frequently disagreed with each other, and with the *Chart*.

Therefore in order to apply Observations made under such Circumstances, the Constructors were obliged to reduce the Difference of Longitude by Account, to the Standard of the *Chart*; for Instance, let us suppose a Ship's Journal makes the Difference of Longitude from the West-end of *Madera* to *Barbadoes*, to be 44 deg. 44 min. and that according to the *Chart*, it is but 40 deg. 40 min. since it cannot be granted, that the Error of 4 deg. 4 min. can arise at once; 'twill be therefore more rational to suppose it diffused thro' the whole Voyage; and then to rectify it, there must be a Decrease of one Degree in eleven; now if an Observation of the Variation was made, when according to Account, the Ship had made 30 deg. 48 min. Difference of Longitude from *Madera*; if the eleventh Part thereof, (*viz.* 2 deg. 48 min.) be taken therefrom, the Remainder (28 deg. 0 min.) will be the Difference of Longitude from *Madera* according to the *Chart*; and if thereto (18 deg. 0 min.) the Difference of Longitude between *London* and the West-end of *Madera* be added, the Sum (46 deg. 0 min.) will be the Longitude of the Place of Observation, according to the Graduation of the *Chart*. But



But as the Longitude of the *Chart* is graduated only at the Equator, and the Latitude but in two Places, and those 230 deg. 0 min. from each other; the Constructors were obliged to make Use of an Instrument to apply those Graduations, in order to fix the Place of Observation expeditiously: At the four Corners of a Rectangular Plane Table, just big enough to contain sixty Degrees of Longitude and as many of Latitude, were placed four flat-headed Screws, to keep a Piece of the *Chart* of that Magnitude secure in its Place; on the Frame of this Table, the Degrees of Latitude from 0 to 60 were graduated and bisected; and on a *T* Ruler also those of Longitude; now if the Edge of the Ruler be applied, so as to pass over the Latitude of the place of Observation on the Frame, and a protracting Pin be moved along it to the Longitude, and there stuck into the Table; it points out the Place of Observation on the *Chart*; which Place was marked with Figures, expressing the Number of Degrees of Variation there observed.

A great Number of Observations made near the same Time, being thus transferr'd to the *Chart*, enabled the Constructors to approve of some and reject others, according as they were supported or not, by concurrent Testimony; and thence to draw Lines representing the Variation at that Time.

There are indeed some Lines described on the *Chart*, that have not so great a Confirmation as that above-mentioned; altho' the Constructors have some Reason to believe them to be worthy the Observation of those, who may sail in those Seas; but these Lines are distinguished from the others, by being dotted or having frequent Breaks in them.

The

The Proprietors of this *Chart* had (before the present Constructors) employ'd Mr. *Leadbetter*, who attempted to have performed *This*, only from Mr. *Douglas's* Observations; his Method seems to have been this;

Since the Variation in 1700, according to Dr. *Halley*, was about 10 deg. 15 min. West, at the *Cape of Good Hope*; and in the Year 1721, or thereabouts, according to Mr. *Douglas* 14 deg. 25 min. West; and since there was some Reason to believe, that in the Twenty-one Years from 1721 to 1742, the like progressive Motion had continued; therefore he concluded, that in the Year 1742, the Variation at the *Cape of Good Hope* was 18 deg. 35 min. West.

The Constructors, altho' they were unwilling to trust an Affair of such Importance to a meer Probability, were far from disregarding the Hint: From the great Quantity of Materials they were possessed of, they doubted not of being able to draw Lines, representing the Variation at the four different Periods of 1711, 1722, 1733, and 1744; and thence by Comparison, to have performed the same for 1755: which if it could have been executed, would have prolonged the Use of the present Undertaking considerably.

The Impracticability of this Scheme will readily appear to those, who will give themselves the Trouble to examine the Situation of the Variation Lines in Dr. *Halley's Chart*, and those in the present, in and near the Bay of *Bengal*; all that will be necessary to say concerning them, is to assure the Public, that no Lines on the *Chart* are described on better Evidence than *Those*; and that the Delineations for the Periods before mentioned, altho' they in a great Measure contribute to confirm the last, yet would not have given



given any thing near Information sufficient, to have formed such kind of Lines as now appear, without Observations made since the Year 1740.

Those Gentlemen who have (during the Course of this Business) publickly advanced, or privately communicated any Hypothesis, by the Help of which, they have imagined, or at least have endeavoured to persuade others to imagine, that if the Latitude and Longitude of any Place on the Terraqueous Globe be given, together with the Time, they then can tell the Variation, would do well to examine the above-mentioned Lines, and not to depend on precarious Principles, unless they can deduce *those* Facts from them.

It is much to be wished, that the learned and ingenious Inhabitants of every Part of the Earth, would periodically observe the Variation of the Needle at those Places where they reside, or thro' which they travel; because their Observations made on Shore, will be less liable to Error than those made at Sea; and because those Observations communicated to the Persons who may hereafter undertake a Work of this Kind (as Time must render it necessary) will enable them, not only to be more certain of the Lines they are to draw over the Oceans; but also to describe the like over the Land, which would render them compleat: There are two powerful Inducements to bestow a little Time and Pains thereon, *viz.* I. That it will produce a general Good, and II. That it will add to the Reputation of those who perform it, if they (being no ways concerned in Maritime Affairs, which is a Case that cannot happen to many) should reap no other Benefit therefrom.

But surely the Mariners, whose Credit with their Employers, depends on an Opinion of their Skill and Fidelity; whose Subsistence and farther

Hopes of making a Fortune in the World, depend on the Success of their present and future Voyages ; nay, whose very Lives depend on their Judgment and Care ; will need no Spur (and to their Honour be it spoken, many of them do not) to excite them to do all in their Power, to render those valuable Blessings (Reputation, Estate, and Life) more secure : it may therefore be sufficient to mention a Method (presumed to be) partly practised by some, and (perhaps) not unworthy the Notice of all.

As there are several Persons in every considerable Ship, who are expected to keep Journals ; suppose so many of them as can be spared from necessary Business, be summoned by the Commander once *per* Day, and required to give an Account of the Place of the Ship at the last Noon ; when, should it happen (as it has been observed before) that any two or more of them disagree therein, let their Quotations from the Log-Board, their Allowances for Variation, Leeway, Currents, Swells, Indraughts, &c. nay even their Computations, be compared ; and from that Comparison, by Agreement of the Assembly, let such a Latitude and Longitude, as shall seem most reasonable, be fix'd for the Ship's Place at that Time, and entred in a Book kept for that Purpose (which might be called, not the Captains, Lieutenants, &c. but, the Ship's Journal) with the Particulars of all the Allowances made in the Calculation thereof, and the most material Occurrences ; especially, Observations of the Variation, made as often as may be, particularly near or upon Shore ; of the Latitudes and Longitudes of Places, made also on Shore ; and of the Direction and Velocity of Currents, &c.

When a Ship comes into Port, let the Difference of Longitude between the Place sailed from, and the  
Port

Port arrived at, according to every particular Man's Account, as well as by the Ship's Journal, be entred therein.

Where several Ships sail together, suppose the Admiral or Commodore was to summon all the Captains as often as Weather, &c. will permit, and in this Meeting that all the particular Ships Journals were produced, and compared; in Order therefrom, to form a Fleets Journal in the same Manner as before.

Suppose again, that these Ships and Fleets Journals were examined at proper Periods, by Persons appointed for that Purpose; might not more accurate Charts be made from them than any extant? Might not the Variation, Currents, &c. be so far accounted for in most Parts of the World, as to render the Business of Navigation, much less uncertain and hazardous than at present? and would not such a Knowledge of the Variation, contribute to the ascertaining the Longitude at Sea?

The Constructors (with great Deference) submit these their Thoughts, also, to the Consideration of those who employ, or have a directing Power over Mariners, viz. To the Right Honourable the Lords Commissioners of the *Admiralty*; to the Honourable the Commissioners of the *Navy*, Corporation of the *Trinity-House*, great *Trading Companies*; and to all the worthy *Merchants* of this Kingdom; making no Doubt, but that if upon mature Deliberation, they shall find the same to be practicable and beneficial, they will order or promote the Execution thereof.

F I N I S.



That arrived at the Court to every particular Minute  
Account, as well as by the 20th January be entered  
in the Court.

And that the said Court, in the said Minute, should the said  
Court of Commissioners was to be taken of the Court  
as often as the Court, and in this  
following, that all the said Court should be  
presented, and continued; in Court, and  
that a Bill should be presented as before.

And that the said Court, in the said Minute, should the said  
Court of Commissioners was to be taken of the Court  
as often as the Court, and in this  
following, that all the said Court should be  
presented, and continued; in Court, and  
that a Bill should be presented as before.



And that the said Court, in the said Minute, should the said  
Court of Commissioners was to be taken of the Court  
as often as the Court, and in this  
following, that all the said Court should be  
presented, and continued; in Court, and  
that a Bill should be presented as before.

And that the said Court, in the said Minute, should the said  
Court of Commissioners was to be taken of the Court  
as often as the Court, and in this  
following, that all the said Court should be  
presented, and continued; in Court, and  
that a Bill should be presented as before.